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Mr. John Carrigan, Section Chief
Department of Environmental Protection
Northeast Regional Office
205B Lowell Street
Wilmington, MA 01887

May 30, 2007

Re: Perimeter Berm Analysis and Design
Crow Lane Landfill, Newburyport, MA

Dear Mr. Carrigan:

On March 7, 2007, the Department issued a Notice of Technical Deficiency to New Ventures Associates, LLC (New Ventures) concerning the geotechnical evaluation of the perimeter berm at the Crow Lane Landfill. Over the past month, SITEC Environmental, Inc. has been working in conjunction with Geocomp Corp. and New Ventures in compiling relevant documentation, performing additional engineering analysis and modifying detail design drawings associated with the perimeter berm design and construction. This letter and the enclosed documents have been prepared in response to the Department's comments.

The following documents are included with this submittal:

- **Technical Memorandum:** April 24, 2007
  Steven Trettel, PE
  Perimeter Berm Foundation Stability
- **Construction Photographs:** Various Dates, 2003
  Berm Subgrade Preparation
  Organic Material Removal
- **Supplemental Analysis And Comment Response:** May 8, 2007
  Geocomp Corporation
  MSE Perimeter Berm

- **Revised Site Plans and Details:** Revised May 9, 2007
  SITEC Environmental, Inc.
  Dwg. No. 3, Final Grading and Stormwater Management
  Dwg. No. 5, Landfill Cross-Sections and Perimeter Access Road/ Berm Details
  Dwg. No. 6, Final Closure System Details and Stormwater Management System Details 1
  Dwg. No. 13, Perimeter Berm Construction, Stage 3 Preparation Plan
  Dwg. No. 14, Westerly Perimeter Berm Construction, Sections and Profile
  Dwg. No. 15, Southerly Perimeter Berm Construction, Sections and Profile

Geocomp Corp. has prepared a detailed response to each of the Department's technical comments concerning the perimeter berm and its ability to remain stable over time. Information supplemental to their response is provided within the following sections along with descriptions of the modifications that have made to enhance the design of the berm and associated drainage features.

1. Berm Foundation:

Photographic documentation has been obtained from New Ventures to confirm that subgrade preparation was performed prior to construction of the existing perimeter berm. The photos included with this submittal show that historic buried waste along with organic materials were excavated from the perimeter of the landfill at the beginning of the project in 2003. The photos were taken by New Ventures personnel and include views from varied locations throughout the site both during the actual removal operations and at its completion. The perimeter of the landfill site is clearly delineated by the haybales that were installed before the excavation was initiated. The disposal of the excavated material on top of the landfill can also be seen on the photos. The excavation operations included the use of multiple excavators, off road dump trucks and other earth moving equipment as required to complete the work.

In support of the New Ventures photos and assurance that waste and organic materials were removed prior to berm construction, Steve Trettel, PE, project manager for New Ventures has prepared a technical memorandum citing his observations of conditions at the perimeter of the landfill and opinion as to the suitability of the existing berm subgrade. In general, the existing berm has been at its current location and elevation for an extended period of time, has successfully retained the waste materials behind it, has remained stable and intact and, has shown no evidence of movement or failure.

These conditions could not have been maintained unless the waste or organic deposits had been totally removed. Mr. Trettel's memo is enclosed.

The continuation of berm construction will include subgrade preparation activities at the base of the existing berm slope and at locations beyond the toe of the berm. These subgrade activities will include excavation for the construction of stone buttresses at locations on the northerly and westerly sides of the landfill as well as preparation for the placement of additional material beyond the existing toe in order to reduce the outer slope of the berm to 1.5H to 1V. Monitoring by the geotechnical engineer during this work will serve as further evidence of previous removal operations and suitability of the existing subgrade for berm construction. The conditions will be documented in a final berm certification report.

2. Berm Construction:

Geocomp Corp. has provided a response to the comments concerning berm construction along with additional discussion of the test pit excavations that were observed and samples of existing berm material that were collected and analyzed. Photos taken by Geocomp of the berm test pits are also included in their response document. Additional analyses have also been performed as requested and recommendations for design modifications to increase factors of safety have been made and incorporated into the revised design. These recommendations include the placement of riprap stone over the 1.5:1 slopes to protect against surficial sloughing and a reduction of the slope of the northerly berm from 1:1 to 1.5:1 with the use of buttresses along the base of the slope. Both the site plans and detail drawings have been modified to reflect these recommendations.

3. Reinforced Earth Wall Design:

Geocomp has provided a response to the Departments comments and describes the additional analyses and design modification that have been recommended and incorporated. With regard to materials to be used in constructing the lower portions of the berm (reducing slope to 1.5:1), New Ventures intends to utilize crushed rock that is being generated from on-site blasting in conjunction with stormwater basin creation. For the MSE portion of the berm, New Ventures has access to a source of asphalt surface grindings from a major highway re-surfacing project in the vicinity of the site. This material is well suited for this application as it has a consistent gradation, is placed, graded and compacted easily, is resistant to erosion and has shear strength far greater than that required for the project. Direct shear testing performed on a sample of typical asphalt grindings provided by New Ventures yielded a shear strength (friction angle) of 52 degrees, exceeding the 40 degrees recommended in the specification. At this time, it is anticipated that these materials will be used in the construction of the MSE portion of the berm and will also be used to supplement the crushed rock in lower berm construction as needed.

Other Berm Related Design Modifications:
Several additional design modifications have been made also along the southerly side of the landfill mainly due to the recommendation for MSE type berm construction and to also reduce the need for existing landfill surface disruption to the fullest extent possible.

The original CAD prepared by GZA GeoEnvironmental, Inc. included the installation of catch basins, manholes and drainage piping within the full length of the southerly berm. The purpose of the drainage system was to convey runoff from the westerly slope of the landfill all the way to Basin no. 1 located at the east side of the landfill for treatment prior to discharge. The discharge from Basin 1 would then flow within a culvert, to be installed adjacent to Crow Lane, back to the wetland at the west side of the landfill. This design was carried forward by SITEC within an Amended CAD submittal. The construction of this drainage system within the southerly perimeter berm no longer appears feasible due to the recommendation for MSE berm construction techniques throughout the entire length of the berm. The MSE berm will include the installation of structural geogrid materials at specified horizontal lengths and at 18-inch vertical intervals. The installation of these drainage structures as well as the construction of the pipeline would cause damage or interruption to the reinforcing grid system that has been designed to maintain the structural integrity of the berm.

As an alternative to these drainage structures and piping, storm water diversion berms have been proposed and are shown on the revised drawings. The diversion berms will be constructed on the westerly slope of the landfill in order to capture the runoff and convey it to the drainage channel to be formed along the inside edge of the southerly berm. This channel, and the top of the berm, will slope in an easterly direction and ultimately discharge to Basin 1. Approximately 95% of the westerly slope runoff will be collected and conveyed to either Basin 1 or Basin 2. The remaining 5% of stormwater runoff from the lower slope area and a portion of the final perimeter berm surface will be collected within a single drainage structure to be installed at the southwest corner of the landfill where it will be discharged to stone channel that ultimately drains to the westerly wetland. This alternate design will ensure that the integrity of the southerly berm is not compromised and will provide long-term storm water runoff control and treatment. This design also facilitates post-closure maintenance requirements and resolves concerns previously expressed by the Department regarding the seal associated with the membrane capping system and these stormwater structures. Please note that revised drainage calculations have been performed and that they will be made part of a separate submittal to the Department as this document is intended to address only structural berm related matters.

It is the intent and desire of New Ventures to minimize landfill surface disruption during the construction of the perimeter berm structure and the installation of the final capping system. This will both facilitate construction and prevent unnecessary odor episode

potential. To accomplish this, New Ventures had another topographic survey performed on the remaining uncapped landfill surface so that we could re-examine the berm and cap design and make any adjustments that may be needed to ensure that everything fits with minimal excavation and/or disruption to the surface. The plans show that previous revisions to the discharge system from Basin 1 caused the proposed limit of waste (back edge of berm) to be pushed further back into the landfill. This change results in the need for waste excavation and relocation along the south side. The revision that caused this situation was the replacement of the originally proposed culvert with the open stone drainage channel along the Crow Lane property line. To rectify this issue, we are now proposing that the culvert discharge from Basin 1 be re-instituted so that the southerly perimeter berm can be moved to its original location and the need for slope adjustment and waste excavation can be eliminated. This culvert system will not be a significant post-closure maintenance issue because only treated stormwater will be flowing through the system and because manhole structures have been added at frequent intervals so that periodic inspection and maintenance cleaning can be performed. The enclosed drawings reflect this design revision.

Based on their review of the Department's technical comments, Geocomp Corporation has completed additional analysis and made further recommendations for the construction of the perimeter berms at the Crow Lane Landfill. These recommendations have been accepted by SITEC Environmental, Inc. and have been incorporated into the design. These design modifications will further increase the long-term structural stability of the perimeter berm and performance of the final cover system.

We hope that the information presented herein adequately addresses the Department's questions. Should you have any additional questions or comments please contact this office. Thank you for your consideration in this matter.

Very truly yours,
SITEC Environmental, Inc.

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Michael Quatromoni
Project Manager